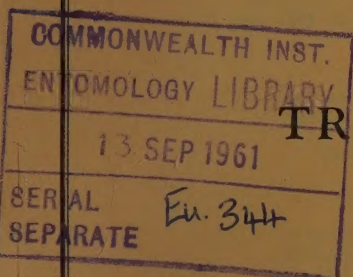


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THE HIMALAYAN SPECIES OF THE GENUS *PHYLLOLABIS* OSTEN SACKEN (DIPTERA : TIPULIDAE)

By CHARLES P. ALEXANDER

(University of Massachusetts, Amherst, Massachusetts)

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With 21 Text-figures

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I. GENERAL CONSIDERATIONS

THE crane-fly genus *Phyllolabis* Osten Sacken was proposed in 1877 for two new species from California. Later the genus was discovered in northern and central Europe and its occurrence there was made the subject of a second paper by Osten Sacken (1896). In more recent years our knowledge concerning *Phyllolabis* has progressed until at present it may be considered as being fairly well known.

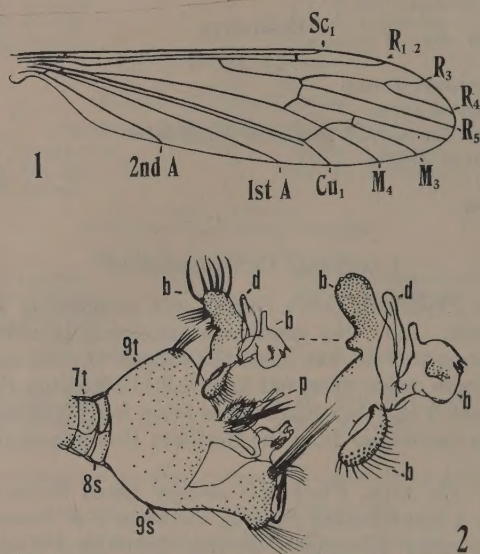
All of the known species are from the Northern Hemisphere, with the following distribution :

Nearctic Region : the type, *Phyllolabis claviger* Osten Sacken (in same paper, with line priority, by a *lapsus* named *pallida*), California ; *P. encausta* Osten Sacken, California ; *P. fenderiana* Alexander, British Columbia, Washington, Oregon ; *P. flavida* Alexander, California ; *P. hirtiloba* Alexander, California, Nevada ; *P. lagganensis* Alexander, Alberta, Washington, Wyoming, Colorado, eastward to the higher mountains of Vermont and New Hampshire ; *P. latifolia* Alexander, Oregon ; *P. meridionalis* Alexander, California ; *P. myriosticta* Alexander, California, southward into Mexico (Baja California) ; *P. sequoiensis* Alexander, California ; and *P. zionensis* Alexander, southern Utah.

Palearctic Region : eight species in Europe, chiefly in the Balkans, with two recently discovered species in the Canary Islands : *Phyllolabis alexanderi* Lack-schewitz, Albania, southern Greece ; *P. hemmingseni* Nielsen, Canary Islands ; *P. lindneri* Mannheims, southern Greece ; *P. macrura* (Siebke), Norway, Sweden, Finland, Austria ; *P. nielsen* Mannheims, central Greece ; *P. pubipennis* Lack-schewitz, Austria, Albania, Bulgaria ; *P. theowaldi* Mannheims, central Greece ; with a still further undescribed species from the Canary Islands. Concerning the distribution of *P. macrura* (originally spelled *macroua*), this was described from Norway and later recorded from Styria, Austria by Strobl and Osten Sacken (1896). In 1939 Lackschewitz questioned the occurrence of *P. macrura* in Austria, believing that the specimens upon which the record was based actually pertained to his species *P. pubipennis*. Only female specimens were available to him and he placed no stress on the presence or absence of macrotrichia in the wing cells, this being a unique

character of *P. pubipennis*. Still later Mannheims (1959) expressed the belief that *P. macrura* is a boreal-alpine species that actually does occur in the Styrian Alps as well as in Scandinavia.

In the Himalayas and western China there is a marked concentration of species, especially in the former, as discussed in the present paper. Three species are known from western China, *Phyllolabis laudata* Alexander, *P. pictivena* Alexander, and *P. vulpecula* Alexander. In the Indian Himalaya, thirteen species are presently known to me, of which three previously had been described while ten are defined as new at this time. These latter species result from the collecting of Dr. Fernand Schmid, to whom my own thanks and that of many other entomologists are due. Dr. Schmid, more than any other single person, is responsible for our present satisfactory knowledge of the crane-flies of India and Pakistan. All of the novelties considered at this time are from Kumaon and Sikkim, many occurring at high alti-



FIGS. 1, 2.—(1) *Phyllolabis claviger* Osten Sacken: venation; (2) *P. beesoni* Alexander: male hypopygium. (A, anals; Cu, cubitus; M, media; R, radius; Sc, subcosta; b, basistyle and its appendages; d, dististyle; p, phallosome; s, sternites; t, tergites.)

tudes and several having been taken in the various *Rhododendron* associations, in company with numerous other Tipulidae of many genera. In the light of our present knowledge of the genus in the Himalayas it seems surprising that no species was known to Brunetti from his detailed work on the Indian Tipulidae.

A single fossil species is known, *Phyllolabis andréei* Alexander (1931) from the Baltic Amber, now generally considered as being Upper Eocene. This is a perfectly typical member of the genus and indicates great antiquity for the group. In the light of its presently known distribution in the Holarctic region, the non-occurrence of *Phyllolabis* in Japan or elsewhere in eastern Asia is most surprising. The possibility exists that the genus still may be found in Japan or Formosa, but from the intensive collecting of the past more than forty years this seems improbable to me, and its discovery there would be most noteworthy. The genera most nearly allied to *Phyllolabis* are *Grahamomyia* Alexander, of western China, and *Horistomyia* Alexander, of Australia.

In 1939 Lackschewitz instituted the practice of naming species of *Phyllolabis* after students of the Tipulidae by describing *P. alexanderi*. This was continued by Mannheims (1959) when he named *P. lindneri*, *P. nielseni* and *P. theowaldi*, and by Nielsen (1959) in describing *P. hemmingseni*. In this paper I have followed the practice by dedicating species to Brunetti, Czizek, Edwards, Lackschewitz, Mannheims, Peus and Senior-White, all outstanding students of Eurasian Tipulidae. The three remaining novelties considered at this time have been named for various native aboriginal tribes that occupy the same general area as does the species concerned. Nothing is known concerning the immature stages of any species of the genus and their discovery would be very desirable, presumably adding to our present ideas of the systematic position of the group.

The types of the species are preserved in the Alexander collection.

II. MORPHOLOGICAL NOTES

In most species of the genus the head is normally hexatome but in *Phyllolabis peusi* the front and also the labial palpi are conspicuously produced, somewhat suggesting the condition found in the genus *Helius* St. Fargeau. The wings are usually unpatterned except for a stigmal darkening or a weak clouding over the anterior cord, especially the *r-m* cross-vein, but a few species have the darkened pattern much heavier, the extreme, as known, being in *P. myriosticta*. Macrotrichia in the wing cells are lacking except in *P. pubipennis*; all known species have strong macrotrichia on the longitudinal veins, generally back to basad of the level of the arculus; in some species one or two trichia occur at near midlength of *m-cu*. The venation is unusually uniform throughout the genus, including the fossil species; vein R_2 is lacking, while *m-cu* commonly lies far distad, at or beyond midlength of M_{3+4} , in several species at or close to the fork of the latter, producing a condition reminiscent of the genus *Trichocera*; cell 1st M_2 is almost uniformly present, open in *P. confluenta* by the atrophy of *m*. The venation of the type, *P. claviger*, is shown in figure 1.

The male hypopygium (fig. 2) is sometimes relatively small and generalised in structure but in most species is large and complicated by outgrowths of various parts. The ninth tergite (*t*) and sternite (*s*) are fused basally into a continuous ring, outwardly separated by a deep incision; the tergite is truncated, not produced caudad, at mid-line with a concentration of about a score of long setae, proctiger more or less developed; the sternite is more or less produced, in cases extended into an appendage, more or less leaf-like in the type, suggesting the generic name. The basistyle (*b*) is borne on the dorsal section of the genital segment, narrowed basally, and produced into one or more flattened blades or spear-like points (designated *outer blade*); with two lobes, the outer one sometimes greatly produced, in some species bearing approximately 20 strongly flattened or fasciculate bristles, in other species these setae of normal appearance (designated *outer lobe*). Nearer the base of the style there is a pale fleshy lobe, usually pendant or recurved, bearing strong setae, very small in species such as *P. brunetti* (fig. 6), longer and more conspicuous in others, as *P. mannheimsi* (fig. 11) and others (designated *basal lobe*). The dististyle (*d*) is single, the structures sometimes considered as representing a second or inner dististyle actually being the outer blade of the basistyle. The phallosome (*p*) is conspicuous, exerted, with variously modified apophyses lying above the paired filaments of the aedeagus, the latter slender to virtually setoid in appearance.

III. KEY TO THE HIMALAYAN SPECIES OF *Phyllolabis*

The characters found in the male hypopygium are not used in this table. They are of prime importance for the final determination of a species.

- 1 Cell M_2 of wings open by the atrophy of *m*; (wings unpatterned, mesonotum brownish-black, side of praescutum and the pleura brownish-yellow).
(Western Himalayas: Simla District) **confluenta** Alexander

- Cell 1st M_2 closed (figs. 1, 4, 8 and others). 2
- 2 Front of head, especially the labial palpi, markedly produced (fig. 3); (thorax orange-yellow, praescutum with a brown central stripe; legs black). (*Sikkim*) **peusi** sp. n.
- Head normally hexatome, front and palpi not produced 3
- 3 Wings more or less patterned with brown, at least with the costal border weakly darkened or with a narrow seam on the anterior cord 4
- Wings entirely without darkened pattern 9
- 4 Darkened wing pattern including the costal border and stigma but not involving the cord; (cell 1st M_2 small, shorter than any of the veins beyond it, $m-cu$ at fork of M_{3+4} ; thorax pale yellow). (*Sikkim*) **limboo** sp. n.
- Darkened wing pattern including at least the anterior cord 5
- 5 Darkened wing pattern extensive, including clouds in the basal and outer radial cells; (cell 1st M_2 large, longer than the distal section of vein M_3 , $m-cu$ at near two-thirds M_{3+4} ; thorax light yellow). (*Sikkim*) **moormi** sp. n.
- Wings with darkened pattern restricted to the vicinity of the veins, lacking in the cells 6
- 6 Legs brownish-black; (darkened seams at $r-m$ and along vein Cu , $m-cu$ near fork of M_{3+4} ; thorax orange). (*Western Himalayas : Kumaon*) **brunettii** sp. n.
- Legs yellow or light brown 7
- 7 Wings more heavily patterned with dark, including the stigma, cord and vague seams over certain of the veins; ($m-cu$ at or before two-thirds the length of M_{3+4} ; thorax testaceous yellow). (*Sikkim*) **kumpa** sp. n.
- Darkened wing pattern greatly reduced, including a faint cloud at $r-m$, chiefly involving the vein 8
- 8 Wings strongly yellowed; thorax uniformly fulvous yellow; vein R_{2+3+4} longer, one-half as long as vein R_3 or more. (*North-east Burma*) **regelationis** Alexander
- Wings pale yellowish-white; thorax orange, anterior end of praescutum weakly darkened; vein R_{2+3+4} shorter, less than one-half vein R_3 . (*Western Himalayas : Kumaon*) **senior-whitei** sp. n.
- 9 General coloration of thorax yellow or orange 10
- General coloration of mesonotum brownish-black or brownish-grey 11
- 10 Rs long, from one-third to one-half longer than R_{2+3+4} , the latter subequal to or shorter than cell 1st M_2 (*Western Himalayas : Kumaon*) **beesoni** Alexander
- Rs shorter, only slightly exceeding R_{2+3+4} , the latter longer than cell 1st M_2 . (*Sikkim*) **czizeki** sp. n.
- 11 Legs brownish-yellow; (wings narrow, $m-cu$ at or near two-thirds M_{3+4} ; mesonotum blackened, pleura reddish-yellow). (*Western Himalayas : Kumaon*) **lackschewitzi** sp. n.
- Legs black, in cases with the femoral bases narrowly yellowed 12
- 12 Wings weakly infuscated; vein $m-cu$ at fork of M_{3+4} ; thorax brownish-black. (*Sikkim*) **edwardsi** sp. n.
- Wings yellowed; vein $m-cu$ at or just beyond mid-length of M_{3+4} ; mesonotum brownish-grey, pleura brownish-yellow. (*Western Himalayas : Kumaon*) **mannheimsi** sp. n.

IV. DISCUSSION OF SPECIES

Phyllolabis beesoni Alexander

Phyllolabis beesoni Alexander, 1929, *Philippine J. Sci.* 40 : 339-40, pl. 1, fig. 16 (wing).

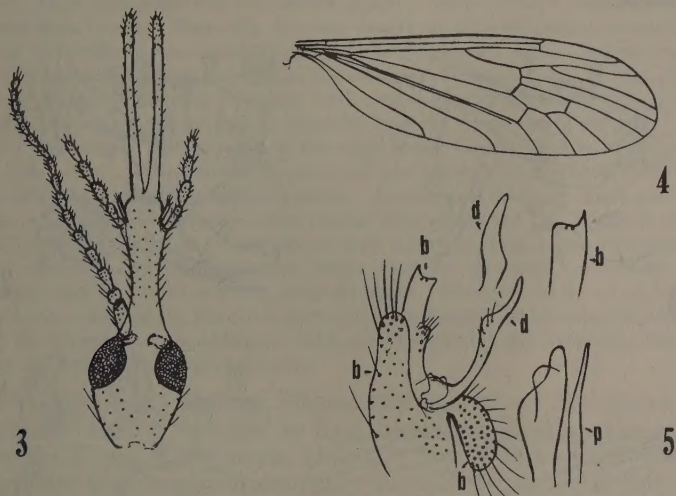
The type female was from Mussoorie, Uttar Pradesh, India, in the western Himalayas, altitude 6500 feet, taken in August 1927 by Mr. C. F. C. Beeson, for whom the species is named. Additional material from Kumaon seems to indicate that the species is not uncommon.

Kumaon, Pauri Garhwal: Tarak Tal, 7540 feet, 14.viii.1958; Pana, 10.viii.1958; Ramni, 8200 feet, 15.viii.1958 (*Fernand Schmid*).

Allotype ♂, Tarak Tal, Pauri Garhwal, 7540 feet, 14.viii.1958.

Male.—Length about 7.5 mm.; wing 8.5 mm.; antenna about 2 mm.

Generally as in the type female, differing especially in the structure of the hypopygium, which here is unusually large and complex in structure. Male hypopygium (fig. 2) with the posterior border of tergite (*t*) truncate, with a concentration of long yellow setae at the midline. Sternite (*s*) strongly produced, the ventral and outer parts sclerotized, the dorsal area membranous and nearly hyaline; at apex with 2 leaf-like blades; dorsal outer part of sternite above the appendages with groups of strong setae, including a dorsal pencil of unusually long setae with twisted tips, dorsad of these with a small appendage that terminates in 3 small lobules. Basistyle (*b*) with the outer lobe blackened, elongate, at and near tip with more than a dozen powerful bristles, several of which are enlarged or fasciculate; basal lobe large, slightly expanded at the obtuse apex; outer blade flattened, discoid in outline, with a long dorsal extension, the outer margin with 2



FIGS. 3-5.—*Phyllolabis peusi* sp. n.: (3) head, dorsal aspect; (4) venation; (5) male hypopygium. (*b*, basistyle and appendages; *d*, dististyle; *p*, phallosome.)

small spinous points. Dististyle (*d*) a large flattened blade, slightly widened at mid-length, thence narrowed to the obtuse tip. Phallosome (*p*) with the dorsal cushions unusually broad, with abundant short setae, apophyses long-produced at tips; filaments of the aedeagus unusually short, their tips acute.

Phyllolabis brunettii sp. n.

Size medium (wing of male over 8 mm.); mesothorax almost uniformly orange; antennae of male relatively long; legs brownish-black; wings whitened, restrictedly patterned with darker at *r-m* and along vein *Cu*; male hypopygium with the basistyle produced outwardly into a slender lobe; apex of outer blade of style trilobed; dististyle long and slender.

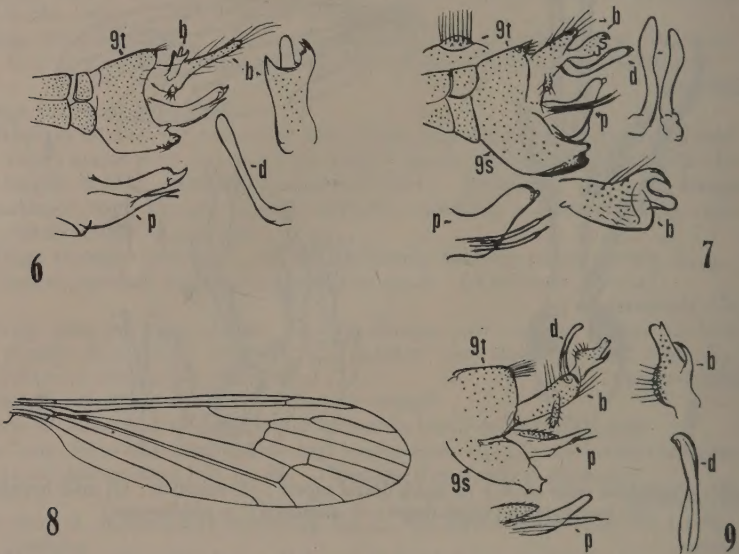
Male.—Length about 8 mm.; wing 8.2 mm.; antenna about 2.6 mm.

Rostrum and palpi brownish-black. Antennae moderately long, as shown by the measurements; scape and pedicel light brown, flagellum black; flagellar segments elongate, exceeding the verticils, the latter only a little longer than the abundant normal setae. Head light grey.

Cervical region and prothorax yellow. Mesonotum orange, the praescutum with a poorly indicated light brown central stripe, most distinct in front; praescutum, scutum and scutellum with conspicuous erect pale setae. Pleura orange yellow. Halteres with stem yellow, knob weakly infuscated. Legs with all coxae and trochanters light yellow; remainder of legs brownish-black or black, femoral bases restrictedly yellowed. Wings whitened, the prearcular and costal

fields slightly more yellowed; a narrow darkened cloud at $r-m$; outer two-thirds of first section of *Cu* broadly infuscated; veins yellow, darker in the clouded parts. Macrotrichia of longitudinal veins conspicuous, lacking on more than the proximal third of *M* and on the narrow bases of the anal veins. Venation: cell R_3 relatively deep, about two and one-half times its petiole; $m-cu$ shortly before fork of M_{3+4} .

Abdomen brown, darker outwardly, hypopygium blackened, the outer styles yellowed. Male hypopygium (fig. 6) with the tergite (*t*) unmodified, the mid-region of posterior border with a few long yellow setae. Sternite (*s*) produced into a low tubercle, its posterior end rounded. Basistyle (*b*) produced into a slender outer lobe that is much longer than either the outer blade of the basistyle or the dististyle, its tip obtuse, with relatively sparse long yellow setae, the longest only a little shorter than the lobe; basal lobe of style unusually short, suboval, subequal in length to its longest setae; outer blade of style yellow, broadly flattened, tip trilobed, the central lobe obtuse, outer lobe multispinous, with 2 major spines and 4 or 5 smaller points, surface of blade with numerous setae, the outer ones smaller. Dististyle (*d*) long and slender, the outer fourth slightly expanded. Phallosome (*p*) enlarged basally, the protruding part small, the major blade with apex pointed.



FIGS. 6-9.—(6, 7) Male hypopygium of: (6) *Phyllolabis brunettii* sp. n.; (7) *P. senior-whitei* sp. n. (8) *P. limboo* sp. n., venation; (9) the same, male hypopygium. (*b*, basistyle and appendages; *d*, dististyle; *p*, phallosome; *s*, sternites; *t*, tergites.)

Holotype ♂, INDIA: Rata, Almora, Kumaon, 11,000 feet, 14.ix.1958 (*Fernand Schmid*).

Phyllolabis brunettii is named in honour of the late Enrico Adelelmo Brunetti (1864-1927), foremost student of the crane-flies of India. The life and works of Brunetti have been discussed in various papers listed in the References—Alexander (1942), Prashad (1927) and Senior-White (1927). The most similar species, such as *P. kumpa* sp. n., have the outer lobe of the basistyle only moderately produced.

Phyllolabis confluenta Alexander

Phyllolabis confluenta Alexander, 1927, *Rec. Indian Mus.* 29: 206-7, fig. (venation).

The types were from Simla in the western Himalayas, 6000-7000 feet, collected in August and September, 1925 by Chopra. The fly is quite distinct from all other regional species in the venation, with cell M_2 open by the atrophy of *m*, and also in

the body coloration, the mesonotum being brownish-black, the pleura and lateral borders of the praescutum brownish-yellow.

Phyllolabis czizeki sp. n.

Size medium (wing of male 7 mm.); thorax fulvous yellow; antennae relatively short, basal segments yellow, flagellum dark brown; legs brownish-yellow, tarsi dark brown; wings weakly tinged with brown, prearcular and costal fields more yellowed, *m-cu* shortly before fork of M_{3+4} ; male hypopygium with the ninth sternite produced, pale, its dorsal surface with 7 or 8 transverse ridges or corrugations; apical blade of basistyle with a strong marginal spine at base; dististyle narrowed gradually to the subacute tip.

Male.—Length about 6.5 mm.; wing 7 mm.; antenna about 1.6 mm.

Rostrum yellow; palpi dark brown. Antennae with scape and pedicel yellow, flagellum dark brown; flagellar segments long-oval, the outer ones small. Head with front yellow, the narrow anterior vertex light grey, posterior vertex darker grey.

Thorax fulvous yellow, scutal lobes darker, pleura clear yellow. Halteres with stem yellow, knob infuscated. Legs with coxae and trochanters yellow; femora obscure yellow, tibiae brownish-yellow, tarsi dark brown. Wings (fig. 14) very weakly tinted with brown, prearcular and costal fields more yellowed; veins brown, yellow in the brightened parts. Macrotrichia on longitudinal veins basad to beyond the level of the arculus. Venation: R_{2+3+4} long, about one-half R_3 ; cell 1st M_2 subrectangular, relatively small; *m-cu* shortly before the fork of M_{3+4} .

Abdomen brownish-yellow, genital segment brownish-black, styli yellowed. Male hypopygium (fig. 15) with the median region of the tergal border slightly concave, with a concentration of long yellow setae. Ninth sternite (*s*) produced into a pale lobe, its dorsal surface with about 7 or 8 parallel transverse ridges or corrugations. Basistyle (*b*) relatively short and stout; outer lobe stout, with long normal setae, some stouter than others but not flattened or fasciculated as in some species of the genus; basal lobe of style relatively stout, about three times as long as broad, tip obtuse; outer blade elongate, larger than the dististyle, yellow, its apex obtuse, lower margin near base with a strong recurved spine. Dististyle (*d*) broad at base, narrowed gradually to the subacute tip, the outer part with a low flange. Phallosome (*p*) unusually small, especially the filaments of the aedeagus, which are shorter than the flattened yellow apophyses, the tips of the latter paling into membrane.

Holotype ♂, INDIA: Lathong, Sikkim, 6500 feet, 26. vii. 1959 (*Fernand Schmid*).

Phyllolabis czizeki is dedicated to Karl Czizek (1871–1925), author of important works on the Tipulidae of Moravia, 1911–13. The fly differs from other species in the structure of the hypopygium, especially the ninth sternite, outer blade of the basistyle, dististyle, and phallosome. It appears to be most nearly allied to *P. lack-schewitzii* sp. n.

Phyllolabis edwardsi sp. n.

Size large (wing of male 7.5 mm.); general coloration of body brownish-black, more or less pruinose; antennae short; legs black, femoral bases restrictedly obscure yellow; wings suffused with brown, *m-cu* at fork of M_{3+4} ; male hypopygium with outer lobe of basistyle stout, with about a dozen fasciculate setae, outer blade of style terminating in a short spine; ninth sternite with a leaf-like terminal appendage, the dorsal margin at apex with abundant yellow setae.

Male.—Length about 7.5 mm.; wing 7.5 mm.; antenna about 1.8 mm.

Rostrum and palpi brownish-black. Antennae relatively short, brownish-black; flagellar segments oval, the outer ones progressively smaller; longest verticils a little shorter than the segments. Head dark brown, pruinose.

Pronotum dark brown. Mesonotum almost uniformly brownish-black, surface subnitidous from a slight pruinosity; praescutum, scutum and scutellum with sparse but long erect setae. Pleura brownish-black, weakly pruinose, dorsopleural region and pleurotergite slightly paler brown. Halteres yellowish-brown. Legs with coxae and trochanters brownish-yellow; remainder of legs black, femoral bases restrictedly obscure yellow. Wings (fig. 16) suffused with brown, the prearcular and costal fields more yellowish-brown; veins brown. Macrotrichia on longitudinal veins basad to beyond the arculus, one on prearcular section of vein 2nd *A* of exceptional length. Venation: cell R_3 deep; basal section of M_3 elongate, about two-thirds longer than *m*; *m-cu* at fork of M_{3+4} .

Abdomen brown, lateral borders narrowly more blackened, ninth segment black. Male hypopygium (fig. 17) with the outer lobe of basistyle (*b*) stout, the obtuse apex with about a dozen long flattened or fasciculate yellow setae, somewhat as in *beesoni*, with abundant normal setae distributed over most of the style; basal lobe of style long-oval, with numerous pale setae; outer blade large, yellow, the basal half expanded, with a small spinule on its disc, the outer part narrowed, terminating in a short spine. Dististyle (*d*) relatively short, expanded at either end, apex unequally bilobed. Phallosome with tips of gonapophyses produced into pale membrane. Ninth sternite (*s*) extensive, the margin fringed with abundant yellow setae, some of the more dorsal ones very long; at apex of the ventral part with a flattened leaf-like appendage, its margins infolded.

Holotype ♂, INDIA: Chamiteng, Sikkim, 9900 feet, 24.viii.1959 (*Fernand Schmid*).

Phyllolabis edwardsi is named for Frederick Wallace Edwards (1888-1940), outstanding student of the Nematocerous Diptera of the World. It is quite distinct from other regional species in the structure of the male hypopygium. In the nature of the fasciculate setae of the outer lobe of the basistyle it agrees with *P. beesoni* and a few other species, differing from all in the remaining structures. The leaf-like appendage of the ninth sternite is very similar to that found in the type, *P. claviger*.

Phyllolabis kumpa sp. n.

General coloration of thorax testaceous yellow; legs light brown; wings weakly tinged with yellow, restrictedly patterned with brown; male hypopygium with ninth sternite terminating in a dense brush of long yellow setae and 2 flattened blade-like lobes; outer lobe of basistyle with about 10 modified flattened setae.

Male.—Length about 7.5-7.7 mm.; wing 7.5-8.2 mm.; antenna about 1.2-1.3 mm.

Female.—Length about 7 mm.; wing 8 mm.

Rostrum and palpi dark brown. Antennae of male broken; in female, scape and pedicel brown, flagellum somewhat paler yellowish-brown; flagellar segments elongate, a trifle longer than the verticils. Head dark brown.

Pronotum brown. Mesonotum almost uniformly dark brown, pleura more pruinose. Halteres with stem dirty white, knob slightly darker. Legs with coxae and trochanters yellow; remainder of legs yellowish-brown to light brown. Wings (fig. 18) weakly tinged with yellow, especially the prearcular and costal fields; a restricted brown pattern that includes the stigma and seams over the cord, outer end of cell 1st M_2 and along vein *Cu*; veins brown, more brownish-yellow in the brightened fields. Virtually all longitudinal veins with conspicuous macrotrichia, lacking on base of *M*. Venation: cell R_3 about one-half longer than its petiole; *m-cu* unusually far basad, at near three-fifths to two-thirds the length of M_{3+4} .

Abdomen brown, male hypopygium large, black. Male hypopygium (fig. 19) with the region of the ninth tergite (*t*) unmodified, the transverse posterior border with a few short setae. Ninth sternite (*s*) produced, the blunt tip with a large brush of long yellow setae, the more ventral ones shorter, below these with 2 flattened blade-like or bladder-like lobes, as figured. Basistyle (*b*) with the blackened outer lobe terminating in about 9 or 10 modified flattened setae that are extended into hair-like points; basal lobe with normal setae; outer blade yellow, complex, as figured, the beak blunt, outer posterior angle extended into a slender point. Dististyle (*d*) smaller, apex obtuse, the outer part fringed with setae. Phallosome (*p*) large, extruded, including 2 paired elements, a shorter pale fleshy lobe that is covered with short setae, and long, sclerotized rods, their tips decurved, farther produced into membrane; filaments of aedeagus slender, the extreme tip a small acute spine.

Holotype ♂, INDIA: Chamiteng, Sikkim, 9900 feet, 24.viii.1959 (*Fernand Schmid*). Allotopotype ♀, slightly teneral, pinned with type. Paratypes, 2 ♂, 2 ♀, Tangshing, Sikkim, 12,200 feet, in *Rhododendron* association, 5.x.1959; 1 ♂, 1 ♀, Gopetang, Sikkim, 12,200 feet, in *Rhododendron* association, 5.x.1959 (*Fernand Schmid*).

The specific name, *kumpa*, is that of a Sikkimese tribe discussed by Hooker in the *Himalayan Journals*. In its conspicuously patterned wings the fly suggests

Phyllolabis pictivena Alexander, of western China, which is quite distinct in the structure of the male hypopygium. The modified setae on the outer lobe of the basistyle are generally similar to those found in *P. beesoni* and a few other regional species.

Phyllolabis lackschewitzi sp. n.

Size medium (wing of male about 6.5 mm.); mesonotum chiefly blackened, pleurotergite and pleura reddish-yellow; antennae short; legs brownish-yellow; wings weakly tinged with brownish-yellow, unpatterned; abdominal tergites brown, sternites more yellowed, ninth segment blackened, yellowed outwardly; male hypopygium generalised in structure, basistyle with outer lobe only slightly developed, outer blade large and conspicuous; dististyle expanded outwardly.

Male.—Length about 6.5 mm.; wing 6.6 mm.; antenna about 1.4 mm.

Rostrum obscure yellow; palpi dark brown. Antennae short; scape and pedicel obscure yellow, flagellum light brown, the bases of the segments paler; segments suboval, the outer ones longer; verticils and setae abundant, especially on segments of proximal half of organ. Head light grey.

Pronotum brownish-yellow. Mesonotum chiefly blackened, humeral and lateral regions of praescutum, mid-region of scutum and parascutella brownish-yellow, mediotergite slightly more pruinose; pleurotergite and pleura reddish-yellow. Halteres with stem yellow, knob infuscated. Legs with coxae and trochanters reddish-yellow; remainder of legs brownish-yellow, outer tarsal segments dark brown. Wings (fig. 12) weakly tinged with brownish-yellow, unpatterned; veins pale brown. Longitudinal veins beyond arculus with conspicuous macrotrichia, lacking on bases of *M* and *Cu*₁. Venation: *Sc*₁ long, about twice *Sc*₂; cell *R*₃ deep; *m-cu* nearly its own length before fork of *M*₃₊₄.

Abdominal tergites brown, sternites more yellowed; base of ninth segment blackened, the apex, with the appendages, yellowed. Male hypopygium (fig. 13) unusually generalised in structure, the tergite and sternite scarcely modified. Basistyle (*b*) with outer lobe only slightly developed, with few setae, 2 or 3 of which are very long; basal lobe unusually large, about one-half as long as the dististyle; outer blade conspicuous, narrowed to the obtuse tip, with a conspicuous spine on lateral margin at near mid-length. Dististyle (*d*) about as long as the blade of basistyle, expanded outwardly. Phallosome (*p*) with the gonapophyses pale, especially at tips; filaments of the aedeagus slender.

Holotype ♂, INDIA: Pagna Malla, Pauri Garhwal, Kumaon, 5955 feet, 11. viii. 1958 (*Fernand Schmid*).

I name this species for Dr. Paul Lackschewitz (1865–1936) who added greatly to our knowledge of the western Palaearctic Tipulidae in a series of papers published between 1923 and 1939. *Phyllolabis lackschewitzi* has the male hypopygium of very simple construction, the most generalised condition so far found in any species of the Eurasian fauna. The most similar species are *P. confluenta*, well distinguished by the open cell *M*₂ of the wings, and *P. czizeki*, which has the thoracic coloration and hypopygial structure distinct.

Phyllolabis limboo sp. n.

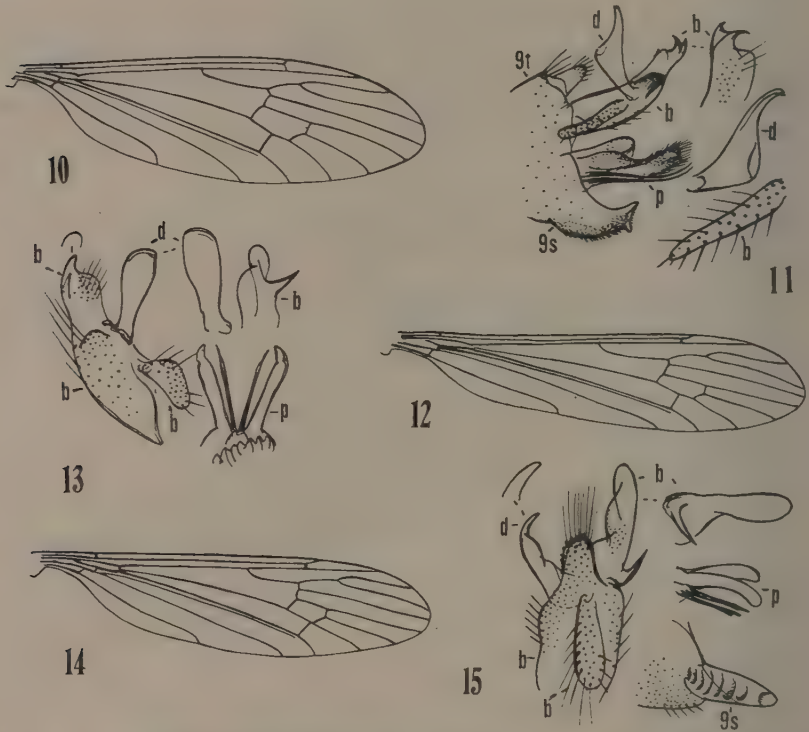
Size medium (wing of male 7 mm.); general coloration of thorax pale yellow; antennae relatively short; wings weakly tinged with brown, cells *C* and *Sc* with stigma, slightly darker; outer radial fork symmetrical, *m-cu* at fork of *M*₃₊₄; male hypopygium with outer lobe of basistyle very low, with long normal setae; outer blade complex, with a strong spine on outer margin; dististyle elongate, slender; phallosome consisting of 3 paired elements, the most dorsal being pale setiferous blades; ninth sternite terminating in pale membrane, weakly trilobate at apex.

Male.—Length about 6.5 mm.; wing 7 mm.; antenna about 1.2 mm.

Rostrum yellow; palpi brownish-black. Antennae relatively short; scape and pedicel obscure yellow, flagellum brownish-black; flagellar segments long-oval, shorter than the longest verticils. Head brownish-yellow.

Thorax uniformly pale yellow; praescutum and scutum with sparse long setae. Halteres broken. Legs with coxae and trochanters yellow; remainder of legs more testaceous yellow to light brown, outer tarsal segments a little darker. Wings (fig. 8) weakly tinged with brown,

cells *C* and *Sc*, with the stigma, slightly darker; veins light brown. Macrotrichia of veins long and conspicuous, lacking on basal fourth of *M* and about the basal third of *Cu*₁, 1st *A* and 2nd *A*. Venation: *Sc*₂ about opposite mid-length of *R*₂₊₃₊₄; radial fork symmetrical; *m-cu* at fork of *M*₃₊₄.



FIGS. 10-15.—(10) *Phyllolabis mannheimsi* sp. n., venation; (11) the same, male hypopygium. (12) *Phyllolabis lackschewitzi* sp. n., venation; (13) the same, male hypopygium. (14) *Phyllolabis czizeki* sp. n., venation; (15) the same, male hypopygium. (*b*, basistyle and appendages; *d*, dististyle; *p*, phallosome; *s*, sternites; *t*, tergites.)

Abdomen brown, basal sternites brighter; ninth segment blackened, the phallosome and dististyle yellowed. Male hypopygium (fig. 9) relatively small. Posterior border of tergite (*t*) truncate, with a concentration of long yellow setae. Sternite (*s*) moderately produced, in pale membrane, in lateral aspect appearing to terminate in 3 weak lobules. Basistyle (*b*) elongate; outer lobe very low to scarcely apparent, with a fringe of long normal setae; outer blade of style yellow, obtuse at tip, with a small tooth or flange near apex, outer margin at mid-length with a powerful acute spine, lower margin opposite this spine dilated, provided with numerous setae; basal lobe relatively long, with numerous setae. Dististyle (*d*) elongate, slender, narrowed and slightly twisted. Phallosome (*p*) protruding, consisting of paired setiferous blades and longer but more slender glabrous rods, their tips narrowly acute; longest element of phallosome a pair of slender rods, their tips acute.

Holotype ♂, INDIA: Tsomgo, Sikkim, 12,500 feet, in *Rhododendron* association, 26. viii. 1959 (Fernand Schmid).

The name, *limboo*, is that of a native tribe, mentioned by Hooker in the *Himalayan Journals*. The fly is readily told from all other generally similar members of the genus by the hypopygial structure, particularly the basistyle and dististyle.

***Phyllolabis mannheimsi* sp. n.**

Size large (wing of male to 8.5 mm.); general coloration of body dark brownish-grey; rostrum stout, slightly produced; antennae short; legs black, femoral bases restrictedly obscure yellow; wings broad, tinged with yellow, *m-cu* at near mid-length of M_{3+4} ; male hypopygium with outer blade of basistyle bidentate at apex, basal lobe very long; dististyle large, more or less triangular in outline, the outer angle more produced; filaments of the aedeagus unusually slender; ninth sternite produced caudad, the surface with very abundant short dark setae.

Male.—Length about 6.5–7 mm.; wing 8–8.5 mm.; antenna about 1.6–1.7 mm.

Female.—Length about 7–7.5 mm.; wing 8.5–9 mm.

Rostrum black, pruinose, stout, strongly produced, about one-half the remainder of head, the produced condition much less than in *peusi*; palpi black. Antennae black, short, as shown by the measurements; flagellar segments oval, exceeding the verticils. Head brownish-grey, anterior vertex depressed medially, posterior vertex with a brownish area on either side.

Pronotal scutum brownish-grey, darker medially, scutellum obscure yellow. Mesonotum dark grey, paler posteriorly; praescutum more blackened medially in front; in cases, the mid-region of scutum, scutellum and anterior half of mediotergite more buffy. Pleura and pleurotergite chiefly obscure brownish-yellow or buffy, mesepisternum dark grey. Halteres with stem pale yellow, knob weakly darkened. Legs with coxae and trochanters brownish-yellow, remainder of legs black, femoral bases narrowly obscure yellow, slightly more extensive on posterior legs. Wings (fig. 10) broad, tinged with yellow, the prearcular costal and stigmal regions more saturated; veins yellowish-brown to light brown. Macrotrichia of veins relatively short, occurring on longitudinal veins back to arculus or virtually so, narrowly lacking on bases of M , Cu and the anals. Venation: Sc_2 variable in position, from before to beyond mid-length of R_{2+3+4} ; *m-cu* at near one-half to about three-fifths the length of M_{3+4} .

Abdomen dark brownish-grey, in cases the more proximal sternites paler. Ovipositor with margins of cerci smooth. Male hypopygium (fig. 11) relatively small; posterior border of tergite (*t*) with about 15 long setae arranged in a diffuse central group; what appears to represent the proctiger is a conspicuous darkened lobe beneath the tergite, tipped with numerous delicate setae. Basistyle (*b*) slender, outer lobe small, darkened, with long normal setae; basal lobe of unusual length, longer than the dististyle, with long setae and more abundant small erect setulae; outer blade of style conspicuous, the produced apex unequally bidentate. Dististyle (*d*) yellow, large, more or less triangular in outline, the outer angle more produced, near outer margin with a low recurved flange. Phallosome (*p*) with elongate yellow setiferous lobes; filaments of aedeagus unusually slender, upcurved to the acute tips. Sternite (*s*) produced into a darkened keel-like lobe, its apex truncate and more or less twisted, lower and apical surfaces with very abundant short dark setae.

Holotype ♂, INDIA: Rata, Almora, Kumaon, 11,000 feet, 14.ix.1958 (*Fernand Schmid*). Allotopotype ♀, pinned with type. Paratopotypes, 8 of both sexes, with the types.

The species is named for Dr. Bernard Mannheims, distinguished student of the Nematoceros Diptera, particularly the Tipulidae and Blepharoceridae. It is one of the most distinct species of the genus, differing especially in significant genitalic characters, especially the basistyle, dististyle and ninth sternite.

***Phyllolabis moormi* sp. n.**

Size large (wing of male 9 mm.); thorax light yellow; antennae of male relatively long; knobs of halteres infuscated; legs yellow; wings light yellow, restrictedly patterned with darker; cell 1st M_2 relatively large, *m-cu* at near mid-length of M_{3+4} ; male hypopygium with outer lobe of basistyle elongate, with very long normal setae; dististyle slender, before tip with a single spine; phallosome long and narrow.

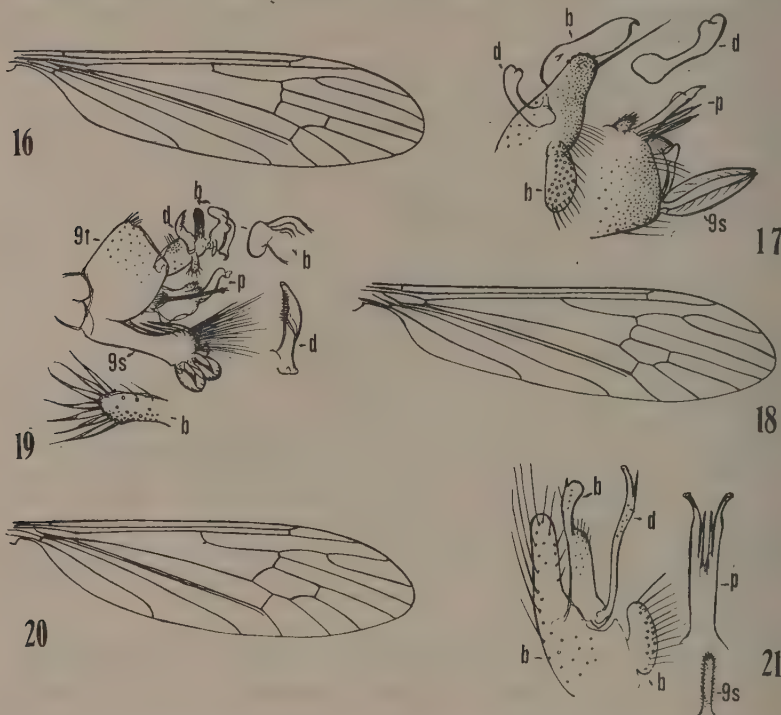
Male.—Length about 8 mm.; wing 9 mm.; antenna about 3 mm.

Female.—Length about 7.5–8.5 mm.; wing 9.5–10 mm.

Rostrum brownish-yellow; palpi light brown. Antennae elongate; basal segments yellow, outer ones light brown; flagellar segments long, much exceeding the small verticils. Head brown, paler behind.

Thorax normally dark brown, in the holotype appearing light yellow, this effect evidently produced by the destruction of body contents through the work of Psocoptera; vestiture of

pronotum, praescutum and scutum white, erect. Halteres with stem pale yellow, knob infuscated. Legs yellow throughout. Wings (fig. 20) light yellow, the prearcular and costal fields more saturated yellow; very narrow darkenings at origin of R_s , cord, fork of R_{2+3+4} and the outer end of cell $1st\ M_2$, chiefly evidenced by a darkening in colour of the otherwise yellow veins; 2 small pale brown clouds at near mid-length of cell R ; in cases the dark pattern heavier and more conspicuous including a spot near proximal end of cell R and another at base of cell M . Macrotrichia of veins relatively short, on longitudinal veins beyond cord, most of R_s , all but the bases of Cu_1 and $2nd\ A$, and outer end of $1st\ A$. Venation: R_s weakly angulated and short-spurred near origin; R_{2+3+4} almost in longitudinal alignment with R_3 , vein R_4 more strongly arcuated at base; basal section of R_5 short to very short; cell $1st\ M_2$ large; $m-cu$ at near mid-length of M_{3+4} .



FIGS. 16-21.—(16) *Phyllolabis edwardsi* sp. n., venation; (17) the same, male hypopygium. (18) *Phyllolabis kumpa* sp. n., venation; (19) the same, male hypopygium. (20) *Phyllolabis moormi* sp. n., venation; (21) the same, male hypopygium. (*b*, basistyle and appendages; *d*, dististyle; *p*, phallosome; *s*, sternites; *t*, tergites.)

Abdomen with proximal segments obscure yellow, outer segments yellowish-brown; ninth segment chiefly blackened, styli more yellowed. Male hypopygium (fig. 21) moderately enlarged; tergite unmodified. Basistyle (*b*) with outer lobe elongate, with sparse but very long normal yellow setae, the longest being about one-half longer than the lobe itself; outer blade of style relatively slender, tip obtuse, with a small subapical spine, basal half more dilated, with numerous setae before the narrowed part; basal lobe tumid beneath, with long erect yellow setae, the longest subequal to the lobe. Dististyle (*d*) slightly longer and more slender than the outer blade of basistyle, its tip obtuse, with a long appressed spine before apex. Phallosome (*p*) consisting of two elongate rods, each split on about the outer third, the inner arm rod-like, evidently pertaining to the aedeagus. Ninth sternite (*s*) apparently bearing a small slender appendage that is densely set with microscopic setulae, those at tip shorter, straight.

Holotype ♂, INDIA: Tsomgo, Sikkim, 12,500 feet, in *Rhododendron* association, 26.viii.1959 (Fernand Schmid). Allotype ♀, Tangshing, Sikkim, 14,100 feet, in

Rhododendron association, 6.x.1959. Paratypes, ♂♂ and ♀♀, with the allotype, 12,200–14,100 feet, 5–6.x.1959; ♂♂ and ♀♀, Gopetang, Sikkim, 12,200 feet, in *Rhododendron* association, 10.x.1959; 1 ♀, Lakchmi Pokri, Sikkim, 14,000 feet, in *Rhododendron* association, 11.x.1959 (*Fernand Schmid*).

The specific name, *moormi*, is that of a native Sikkimese tribe. The most nearly related species would appear to be *Phyllolabis regelationis* Alexander of north-east Burma, of which the male sex remains unknown. This differs in the coloration of the body and in colour, vein trichiation and venation of the wings. Certain features of the hypopygium indicate a further relationship with the otherwise quite different *P. peusi* sp. n.

Phyllolabis peusi sp. n.

Size medium (wing about 8 mm.); thorax orange-yellow, praescutum with a dark brown central stripe; head narrowed behind, mouthparts greatly produced, especially the labial palpi, the combined rostrum and mouthparts longer than the antennae; legs black; wings yellow, the anterior cord darkened, *m-cu* at or before three-fourths the length of M_{3+4} ; male hypopygium of generalised structure, relatively small, both the tergite and sternite unmodified; setae of outer lobe of basistyle normal, outer blade parallel-sided, tip bidentate; dististyle a simple, gently sinuous blade.

Male.—Length about 6.5–7 mm.; wing 7–8 mm.: antenna about 1.5–1.8 mm.

Female.—Length about 7–7.5 mm.; wing 7.5–8.5 mm.; antenna about 1.6–1.7 mm.

Rostrum and palpi black, markedly produced in both sexes, especially the labial palpi, the combined rostrum and mouthparts about twice the length of remainder of head and longer than the antennae; rostrum and labial palpi subequal (fig. 3). Antennae black, relatively long, flagellar segments exceeding the verticils. Head dark grey, narrow, especially posteriorly, eyes relatively small.

Cervical region dark brown. Pronotum brown, yellowed behind and on sides. Mesonotal praescutum orange yellow, with a conspicuous dark brown central stripe that does not reach the suture, remainder of thorax light orange yellow. Halteres yellow, knob weakly darkened. Legs with coxae and trochanters yellow; remainder of legs black, femoral bases narrowly obscure yellow. Wings (fig. 4) yellow, the prearcular and costal regions clearer yellow, including the veins, remaining veins brown, with darkened clouds on anterior cord, *m-cu* and outer end of cell 1st M_2 . Macrotrichia of veins long and conspicuous, lacking on proximal two-thirds of *M* and 1st *A*. Venation: fork of R_{2+3+4} asymmetrical, the vein being in general alignment with R_3 , R_4 more arcuated; *m-cu* at from about one-half to three-fourths M_{3+4} ; cell 1st M_2 large, subequal in length to distal section of M_{1+2} .

Abdomen dark brown, genitalia yellowish-brown to obscure orange. Ovipositor with cerci relatively slender, margins smooth. Male hypopygium (fig. 5) relatively small and generalised in structure; mid-region of posterior border of tergite gently concave, without the usual concentration of setae; ninth sternite unmodified. Basistyle (*b*) with outer lobe of moderate size, directed caudad, with unmodified setae at apex; outer blade of style yellow, directed ventrad, nearly parallel-sided, apex bidentate, at base with a conspicuous flange that bears strong setae; basal lobe large, with long setae. Dististyle (*d*) a long slender blade, gently sinuous, slightly flattened and expanded before the subacute tip, the intermediate part with a few long setae. Phallosome (*p*) including 2 flattened blades, convoluted and expanded outwardly, all margins obtuse; filaments of aedeagus relatively stout, narrowed into a spine-like point.

Holotype ♂, INDIA: Tangshing, Sikkim, 14,100 feet, in *Rhododendron* association, 6.x.1959 (*Fernand Schmid*). Allotopotype ♀, pinned with type. Paratopotypes, ♂♂ and ♀♀, with the types; paratypes, ♂♂ and ♀♀, Gopetang, Sikkim, 12,200 feet, in *Rhododendron* association, 10.x.1959; ♂, Yangsap, Sikkim, 13,120 feet, in *Rhododendron* association, 9.x.1959 (*Fernand Schmid*).

The species is dedicated to Director Fritz Peus, of the Zoological Museum, West Berlin, distinguished Dipterologist, author of the fascicles in Lindner's *Die Fliegen* covering the Cylindrotominae and the Tanyderidae-Ptychopteridae (Liriopoidea). *Phyllolabis peusi* is entirely distinct from all other members of the genus in the

structure of the head and mouthparts, the latter suggesting a nectar-feeding habit for the species.

Phyllolabis regelationis Alexander

Phyllolabis regelationis Alexander, 1953, *Ann. Mag. nat. Hist.* (12) 6: 187.

The type was from the Adung Valley, North-east Burma, 12,000 feet, collected 16.viii.1913 by Francis Kingdon-Ward.

Female.—Length about 6.5–7 mm.; wing 8–9 mm.

Rostrum light brown, palpi black. Antennae with scape and pedicel brown, flagellum testaceous yellow. Head grey. Thorax almost uniformly fulvous yellow, propleura and anterior pretergites light yellow; vestiture of praescutum and scutum sparse but elongate, pale. Halteres with stem whitened, knob obscure orange. Legs yellow, femoral tips very vaguely darkened, outer tarsal segments infuscated. Wings pale yellow, the prearcular region and costal border slightly more saturated; a very small brown cloud over the anterior cord, best indicated by a deepening in colour of *r-m* and the adjoining veins, remaining veins yellow. Macrotrichia of veins relatively short and pale, as compared with *beesoni*. Venation: *m-cu* far basad, opposite one-half to two-thirds M_{3+4} .

The most similar species is *Phyllolabis vulpecula* Alexander, of Szechwan, western China.

Phyllolabis senior-whitei sp. n.

General coloration orange to yellow, praescutum more or less darkened medially in front; antennae relatively long; legs brownish-yellow; wings yellowish white, *r-m* slightly darkened; male hypopygium with outer lobe of basistyle shorter than the outer blade, its setae normal.

Male.—Length about 7.2–7.5 mm.; wing 7.5–7.8 mm.; antenna about 1.8–1.9 mm.

Rostrum pale brownish-yellow, palpi dark brown. Antennae of male relatively long, as shown by the measurements, dark brown; flagellar segments long-oval, exceeding the verticils. Head dark grey.

Pronotum brown, paler on sides. Mesonotum of type dull yellowish-orange, praescutum weakly darkened in front, in paratypes brownish-yellow and more evidently darkened anteriorly; posterior sclerites and pleura of type orange, of paratypes more yellowed. Halteres with stem yellow, knob infuscated. Legs with coxae and trochanters yellow; remainder of legs brownish-yellow, outer tarsal segments dark brown. Wings yellowish-white, cells *C* and *Sc* slightly more darkened; veins yellow, *r-m* slightly more darkened. Macrotrichia of longitudinal veins beyond the level of origin of *Rs*, lacking on bases of *M*, *Cu* and the anals. Venation: *m-cu* at near three-fourths the length of M_{3+4} ; in the holotype, cell M_2 open by the atrophy of *m* in both wings, closed in the paratypes.

Abdominal tergites dark brown, sternites paler brown; ninth segment blackened, outer appendages more yellowed. Male hypopygium (fig. 7) with central area of tergal border (*t*) slightly produced, provided with long setae. Sternite (*s*) produced ventrad, the mid-area beneath strongly compressed to appear carinate. Basistyle (*b*) produced into a relatively short outer lobe that is provided with relatively sparse normal setae; basal lobe oval, with sparse strong setae; outer blade of style large, flattened, apex trilobed, the upper lobe acute, with 3 or 4 smaller subapical denticles, lateral lobes obtusely rounded, surface of blade with strong yellow setae. Dististyle (*d*) relatively short, flattened, outer third more expanded, tip obtuse. Phallosome (*p*) enlarged at base, lobes and aedeagus moderately produced, tips of the filaments very slender.

Holotype ♂, INDIA: Rata, Almora, Kumaon, 11,000 feet, 14.ix.1958 (*Fernand Schmid*). Paratype, ♂, Ramni, Pauri Garhwal, Kumaon, 8200 feet, 15.viii.1958; 1 ♂, Dakwani, Pauri Garhwal, 9300–11,000 feet, 5.viii.1958 (*Fernand Schmid*).

I name this species for the late Ronald Senior-White, Malariologist, who between 1921 and 1924 published important papers on the crane-flies of Assam and Ceylon. The most similar species is *Phyllolabis brunetti*, which differs evidently in the hypopygial characters, especially of the basistyle, dististyle and ninth sternite. The shape of the outer blade of the basistyle is approximately the same in both species.

P. regelationis differs most evidently in the wing coloration and venation but the still unknown male undoubtedly will provide stronger distinctions. I regard the open cell M_2 of the wings in the holotype of *P. senior-whitei* as representing an abnormal condition, as it is not shown by the paratypes. In this respect the holotype suggests *P. confluenta*, otherwise entirely distinct in body coloration.

V. SUMMARY

The thirteen species of the genus *Phyllolabis* Osten Sacken at present known from the Indian Himalayas are discussed, and a description of the ten new ones included. A general consideration of the scope and distribution of the known species of the genus is given and a key to the Himalayan species is provided.

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